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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/063,104	03/21/2002	Charles Adrian Becker	RD-29430	3459
6147	7590	06/29/2004		
GENERAL ELECTRIC COMPANY GLOBAL RESEARCH PATENT DOCKET RM. BLDG. K1-4A59 SCHENECTADY, NY 12309			EXAMINER PATEL, ISHWARBHAI B	
			ART UNIT 2827	PAPER NUMBER

DATE MAILED: 06/29/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	<b>Application N .</b> 10/063,104	<b>Applicant(s)</b> BECKER ET AL. <span style="float: right;">AK</span>	
	<b>Examiner</b> Ishwar (I. B.) Patel	<b>Art Unit</b> 2827	

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1) ☒ Responsive to communication(s) filed on 05 January 2004.

2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.

3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4) ☒ Claim(s) 1-57 is/are pending in the application.

4a) Of the above claim(s) 14-57 is/are withdrawn from consideration.

5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.

6) ☒ Claim(s) 1-13 is/are rejected.

7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.

8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

9) ☐ The specification is objected to by the Examiner.

10) ☒ The drawing(s) filed on 21 March 2002 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.  
     Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
     Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
     a) ☐ All    b) ☐ Some    c) ☐ None of:

        1. ☐ Certified copies of the priority documents have been received.

        2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.

        3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date <u>March 29, 2004</u> .	4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) 6) <input type="checkbox"/> Other: _____.
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**DETAILED ACTION**

***Election/Restrictions***

1. Applicant's election of group IIA, claims 1-26, in the reply filed on January 5, 2004 is acknowledged. Because applicant did not distinctly and specifically point out the supposed errors in the restriction requirement, the election has been treated as an election without traverse (MPEP § 818.03(a)).

2. Group IIA, of this application contains claims directed to different species of the claimed invention. The present examiner would like to restrict group IIA, claims 1-26, into the species as described below.

Specie I	Figures 3-4.
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Specie II	Figures 5-6.
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Applicant is required under 35 U.S.C. 121 to elect a single disclosed species for prosecution on the merits to which the claims shall be restricted if no generic claim is finally held to be allowable. Currently, no claim is generic.

Applicant is advised that a reply to this requirement must include an identification of the species that is elected consonant with this requirement, and a listing of all claims readable thereon, including any claims subsequently added. An argument that a claim is allowable or that all claims are generic is considered nonresponsive unless accompanied by an election.

Upon the allowance of a generic claim, applicant will be entitled to consideration of claims to additional species which are written in dependent form or otherwise include all the limitations of an allowed generic claim as provided by 37 CFR 1.141. If claims are added after the election, applicant must indicate which are readable upon the elected species. MPEP § 809.02(a).

Should applicant traverse on the ground that the species are not patentably distinct, applicant should submit evidence or identify such evidence now of record showing the species to be obvious variants or clearly admit on the record that this is the case. In either instance, if the examiner finds one of the inventions unpatentable over the prior art, the evidence or admission may be used in a rejection under 35 U.S.C. 103(a) of the other invention.

3. During a telephone conversation with Toan P. Vo (Reg. 43,225) on June 18, 2004, a provisional election was made without traverse to prosecute the invention of specie II, claims 1-13, reading on Figures 5-6, single flexible interconnect. Affirmation of this election must be made by applicant in replying to this Office action. Claims 14-57 are withdrawn from further consideration by the examiner, 37 CFR 1.142(b), as being drawn to a non-elected invention..

4. Applicant is reminded that upon the cancellation of claims to a non-elected invention, the inventorship must be amended in compliance with 37 CFR 1.48(b) if one or more of the currently named inventors is no longer an inventor of at least one claim

remaining in the application. Any amendment of inventorship must be accompanied by a request under 37 CFR 1.48(b) and by the fee required under 37 CFR 1.17(i).

### ***Drawings***

5. The drawings are objected to because:

(a) the figures are improperly cross hatched. All of the parts shown in section, and only those parts, must be cross-hatched. The cross-hatching patterns should be selected from those shown on page 600-114/115 of the MPEP based on the material of the part. See also 37 CFR 1.84(h)(3) and MPEP § 608.02.

(b) The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, a dielectric protective layer disposed to cover said electrical circuit component and circuit traces, as claimed in claim 5, the heat sink has fins extending away from said dielectric film as claimed in claim 8, the heat sink comprises heat pipes, as claimed in claim 9 and the heat sink comprises a mechanism for active cooling, as claimed in claims 10 and 11, must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

Corrected drawing sheets are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the

appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.84(c)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

***Claim Rejections - 35 USC § 102***

6. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

7. Claims 1-4,6,7,12 and 13 are rejected under 35 U.S.C. 102(b) as being anticipated by Kirby, US Patent No. 4,563,725.

**Regarding claim 1**, Kirby discloses a flexible interconnect structure comprising: a flexible dielectric film (insulating laminate 1 of flexible polyimide, figure 1) having two opposed surfaces, at least a portion of said dielectric film being removed through a thickness thereof, forming at least a removed portion (plurality of holes 15, figure 1); circuit traces (conductive array 2, figure 1) disposed on at least one of said surfaces,

and at least a heat sink (heat sink pillar 17 with plate 16, figure 1) being attached to a surface of said dielectric film, said at least a heat sink covering said at least a removed portion (covering holes 15, figure 1).

**Regarding claim 2**, Kirby further discloses said dielectric film made of polyimide (column 6, line 30-35).

**Regarding claim 3**, Kirby further discloses said dielectric film has a thickness of about 0.5 mm, which is within the range from about 1 micrometer to about 5 mm, (column 6, line 30-35).

**Regarding claim 4**, Kirby further discloses an integrated circuit as an electrical circuit component (column 6, line 45-49).

**Regarding claim 6 and 7**, Kirby further said at least a heat sink comprises a thermally conductive material selected from metal (thermally conductive plate 16 suitably of aluminum copper, beryllium copper or phosphor bronze, column 6, line 60-63).

**Regarding claim 12**, Kirby further discloses said at least a heat sink covers a plurality of said removed portions (plurality of holes 15, figure 1).

**Regarding claim 13**, Kirby further discloses said at least a heat sink comprises a body made of a material selected from the group consisting of metals (thermally conductive plate 16 suitably of aluminum copper, beryllium copper or phosphor bronze, column 6, line 60-63), said body covering substantially an entire surface of said dielectric film opposite to a surface on which circuit traces are disposed (plate 16, figure 1).

***Claim Rejections - 35 USC § 103***

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kirby, as applied claim 1-4, 6, 7, 12 and 13, in view of Haley, US Patent No. 5,506,756 and Pastore et al., US Patent No. 5,285,352.

Regarding claim 5, the applicant is further claiming a dielectric protective layer disposed to cover said electrical circuit component and circuit traces. Kirby fails to disclose such protective layer.

Haley discloses a package with an integrated circuit mounted on the flexible circuit board with a housing, preferably injection molded plastic material covering the integrated circuit and the traces, providing enough stiffness to structurally support the



component and the circuit board, column 2, line 40-45 and column 3, line 43-46, figure 1 and 5.

Pastore et al., discloses a semiconductor device with the die and portion of the substrate encapsulated in a conventional epoxy resin package.

As disclosed by Haley and Pastore, it is well known in the art to provide a protective cover to the component and the substrate to encapsulate for protection against environmental and other damage and to provide necessary stiffness.

Therefore, it would have been obvious to a person of ordinary skill in the art at the time of applicant's invention to provide the assembly of Kirby with a protective layer, from the teachings of Haley and Pastore et al., in order to encapsulate the component and the substrate to have a protection against environmental and other damage and to provide necessary stiffness to the assembly.

9. Claims 8-11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kirby, as applied claim 1-4, 6, 7, 12 and 13, in view of Azar, US Patent No. 5,920,458.

**Regarding claim 8**, the applicant is further claiming at least heat sink has fins extending away from said dielectric film.

Kirby fails to disclose such fins to the heat sink.

Azar, in embodiment shown in figure 4, discloses a printed circuit board assembly with an enhance cooling of a heat dissipating circuit element, with a heat sink having fins (32, figure 4) for enhancing the heat dissipation.

A person of ordinary skill at the time of applicant's claims invention would have recognized the advantage of providing fins to the heat sink in order to enhance the heat dissipation rate.

Therefore, it would have been obvious to a person of ordinary skill in the at the time of applicant's invention to provide the assembly of Kirby with the heat sink having fins, as taught by Azar, in order to in order to enhance the heat dissipation rate.

**Regarding claim 9-11**, the applicant is further claiming said heat sink  
Comprise heat pipes to carry heat away from an electrical component disposed thereon, as claimed in claim 9, said heat sink comprises a mechanism for active cooling, as claimed in claim 10 and said active cooling is effected by a mechanism selected from forced cooling or refrigeration.

Kirby does not disclose such limitations.

Azar, in another embodiment (figure 5), further discloses the heat dissipation member comprises a hollow core heat exchanger 36. A flow controller 38, which may be refrigerator-type device, in fluid communication with a through bore 39 of the heat exchanger 36. Either liquid or air can be utilized as a coolant and the flow controller 38 effects the passage of such coolant through the through bore 39 of the heat exchanger 36, column 3, line 35-43, for further enhancing the heat dissipation rate.

A person of ordinary skill at the time of applicant's claims invention would have recognized the advantage of providing such elements to enhance the heat dissipation rate.

Therefore, it would have been obvious to a person of ordinary skill in the art at the time of applicant's invention to provide the assembly of Kirby with said heat sink comprising heat pipes to carry heat away from an electrical component disposed thereon, as claimed in claim 9, said heat sink comprising a mechanism for active cooling, as claimed in claim 10 and said active cooling is effected by a mechanism selected from forced cooling or refrigeration, as taught by Azar, in order to enhance the heat dissipation rate.

### ***Conclusion***

10. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Chao, Griffin et al., Hochstein, Majumdar et al., discloses circuit assembly similar to applicant's claimed invention.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ishwar (I. B.) Patel whose telephone number is (571) 272 1933. The examiner can normally be reached on M-F (8:30 - 5:00).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kamand Cuneo can be reached on (571) 272 1957. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Art Unit: 2827

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

I B Patel  
Examiner  
GAU: 2827  
June 25, 2004

*David A. Zarndke*  
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6/26/04